

## **ABSTRACT**

A method and apparatus for detecting adverse conditions during the analysis of chemical and biological processes are disclosed. In one embodiment, the reaction conditions in a microelectrochemical reaction chamber are monitored. The reaction chamber comprises electrodes arranged to pass an electric current through reaction mixture located within the reaction chamber, thereby inducing an electrochemical reaction. A detection circuit is provided to detect and measure the electric current flowing between the electrodes. The detection circuit is arranged to generate a signal indicating whether the measured current lies inside or outside a predetermined range of values. If the measured current lies outside the expected range of values, then the reaction conditions are adverse. A single pair of electrodes may perform a dual function of both inducing the electrochemical reaction and allowing the current flowing through the mixture to be measured. In another embodiment, electrodes are used to monitor the conditions in a chamber for detecting the presence of analytes using the combined techniques of surface enhanced Raman scattering and surface plasmon resonance.